

restaurants provide quick service and most customers do not linger after their meals. See *Nation's Restaurant News*, July 5, 1993.

[27] Smoking Bans Extend to Apartment Buildings

According to a press report, Signature Management Inc. of Baltimore, Maryland, has decided to implement smoking bans in all public areas of the apartment buildings it manages. Published reports out of Washington, D.C., about the purported health hazards of ETS exposure, and not tenant complaints, apparently motivated the action. Smoking in individual apartments will not be affected. See *The Baltimore Sun*, July 17, 1993.

[28] Mall Manager to Implement Smoking Bans at All Properties

JMB Retail Properties, which manages 60 shopping malls across the country, will reportedly ban smoking at all of its facilities by the end of 1993. Although individual stores will be permitted to set their own policies, and smoking will apparently be permitted in some restaurants, the ban will include food courts and hallways. The decision to ban smoking was reportedly based on the EPA Risk Assessment on ETS. According to a spokesperson for the International Council of Shopping Centers, the number of smoke-free malls has climbed from a mere handful to more than 100 within the last six months. See *Miami Herald*, July 21, 1993.

[29] A New Indoor Air Diagnostic Tool: Mold-Sniffing Dogs

According to a paper presented at a recent scientific meeting, dogs can apparently be trained to "sniff out" hidden bacterial and fungal contamination in buildings. Swedish researchers reported at Indoor Air '93, a major conference held in Helsinki, Finland, that a trained dog located contamination hidden in insulation behind other building materials.

MEDIA COVERAGE

[30] "Second-Hand Science," Editorial, *National Review*, July 19, 1993

This editorial criticizes the EPA and its methodologies, particularly with regard to the Risk Assessment on ETS.

The article quotes Representative John Dingell (D-Mich.) who once said of the EPA, "It cooks the books with great vigor." The author is skeptical that elevating the EPA to Cabinet level status and requiring that each EPA regulation be supported by the best scientific data will "change the way the EPA does business."

In discussing the ETS risk assessment, the author applauds the tobacco industry's challenge of the EPA, writing "tobacco growers and cigarette companies are serving the public interest in taking the EPA to court for its misuse of science in declaring environmental tobacco smoke (ETS) a 'Class A carcinogen' its most deadly category." Characterizing the lowering of confidence intervals and the agency's use of meta-analysis as "scandalously manipulative standards," the author concludes, "We are on the side of the fighters where science supports them, however politically incorrect they may be."

[31] CNN Broadcast Explores Discrimination for Off-the-Job Activities

On July 25, 1993, CNN Weekend broadcast a report on cable television that discussed issues related to discrimination for off-the-job activities such as smoking, drinking, or participating in high risk sports and hobbies. According to a representative of the American Civil Liberties Union who appeared during the broadcast, 28 states now have laws prohibiting such discrimination. Apparently, a number of corporations are currently monitoring the smoking habits of their employees by administering urine tests and by encouraging other employees to inform company personnel if they see a co-worker smoking off the job. See *CNN Inside Business*, July 25, 1993.

SCIENTIFIC/TECHNICAL ITEMS

LUNG CANCER

[32] "Exposure to Environmental Tobacco Smoke and Female Lung Cancer in Guangzhou, China," Y.X. Du, Q. Cha, Y.Z. Chen, and J.M. Wu, *Proceedings of Indoor Air '93* 1: 511-516, 1993 [See Appendix A]

Based on several epidemiological analyses of data collected in Guangzhou, China, the authors report that

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"[a]ll results of these studies demonstrated that exposure to ETS had no association with female lung cancer." From their case-control study of 75 women and 128 controls, the authors report an overall risk estimate of 1.19 (95% CI 0.66-2.16) for husband ever having smoked. This risk estimate is not statistically significant.

- [33] "Involuntary Smoking in the Restaurant Workplace: A Review of Employee Exposure and Health Effects," M. Siegel, *Journal of the American Medical Association* 270(4): 490-493, 1993 [See Appendix A]

The author of this paper reviews published indoor air quality data for bars and restaurants, in comparison with offices and residences, and epidemiologic studies of lung cancer risk in food service workers. He claims that ETS levels are substantially elevated in restaurants, and that ETS exposures could account for some of the elevated lung cancer risk reported for food service workers. The author concludes that smoking should be prohibited in restaurants and bars "to protect these workers."

RESPIRATORY DISEASES AND CONDITIONS — CHILDREN

- [34] "Race and Gender Differences in Respiratory Illness Prevalence and Their Relationship to Environmental Exposures in Children 7 to 14 Years of Age," D.R. Gold, A. Rotnitzky, A.I. Damokosh, J.H. Ware, F.E. Speizer, B.G. Ferris, and D.W. Dockery, *American Review of Respiratory Disease* 148: 10-18, 1993 [See Appendix A]

This study, part of the Harvard Six Cities Study, reports that maternal smoking was associated with elevated risks of wheeze and other respiratory symptoms in the children studied. The authors note, however, that racial differences in symptom prevalence could be related to socioeconomic differences.

ETS EXPOSURE AND MONITORING

- [35] "Hair Analysis as a Marker for Fetal Exposure to Maternal Smoking," J. Klein, D. Chitayat, and

G. Koren, *New England Journal of Medicine* 328(1): 66-67, 1993 [See Appendix A]

The authors of this letter to the editor report that they have measured higher cotinine levels in the hair of women and infants reportedly exposed to ETS than in women and infants reportedly not exposed.

- [36] "Determination of Airborne Cadmium in Environmental Tobacco Smoke by Instrumental Neutron Activation Analysis with a Compton Suppression System," S. Landsberger, S. Larson, and D. Wu, *Analytical Chemistry* 65: 1506-1509, 1993 [See Appendix A]

This study details a new methodology for measuring cadmium, purportedly from ETS, in indoor air. The authors call ETS a "significant source" of cadmium, and claim that cadmium levels in places where smoking is allowed may be 30 times higher than in non-smoking areas.

- [37] "Estimated Reduction in Exposure to Environmental Tobacco Smoke Through Removing Smoking in the Workplace," A. Raynal, P.S. Burge, A. Robertson, M. Jarvis, M. Archibald, and D. Hawkin, *Proceedings of Indoor Air '93* 1: 639-643, 1993 [See Appendix A]

The authors of this study compare questionnaire responses concerning perceived ETS exposures and salivary cotinine levels in 1,200 office workers. They report a positive correlation between perceived exposure and salivary cotinine, and suggest that 85% of nonsmokers would "have a substantial reduction in ETS exposure" if smoking were to be banned in the workplace studied.

INDOOR AIR QUALITY

- [38] "Effectiveness of Ventilation and Other Controls in Reducing Exposure to ETS in Office Buildings," S.B. Hayward, K.-S. Liu, L. Alevantis, K. Shah, S. Loiselle, F.J. Offermann, Y.-L. Chang, and L. Webber, *Proceedings of Indoor Air '93* 5: 509-514 [See Appendix A]

This study, conducted in California, evaluates exhaust ventilation, physical barriers, and other

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methods "for protecting non-smokers from" ETS. The authors report that ETS concentrations varied according to the engineering controls used.

- [39] "Legionnaires' Disease: The Infective Dose Paradox," S.J. O'Brien and R.S. Bhopal, *The Lancet* 342: 5-6, 1993 [See Appendix A]

The authors of this commentary briefly review data on *Legionella*, the bacterium responsible for the form of pneumonia called Legionnaires' disease. They call for further investigations into the infective hazard of *Legionella*.

- [40] "Big Air Quality Complainers — Are Their Office Environments Different from Workers with No Complaints?" R.M. Tamblyn, R.I. Menzies, F. Nunes, J. Leduc, J. Pasztor, and R.T. Tamblyn, *Proceedings of Indoor Air '93* 1: 133-138, 1993 [See Appendix A]

This study investigates the possible role of methodological problems in the lack of reported associations between worker perceptions and actual measurements of IAQ. The authors conclude that significant environmental differences existed between the offices of "complainers" and persons who did not complain, and that worker susceptibility, work conditions, and office environment may act multiplicatively to increase complaints and reported symptoms.

- [41] "Sensitization to Domestic Mites in a Cold Temperate Region," M. Wickman, S.L. Nordvall, G. Pershagen, J. Korsgaard, and N. Johansen, *American Review of Respiratory Disease* 148: 58-62, 1993 [See Appendix A]

This Swedish study reports that house dust mites do occur in a cold, temperate, region. Moreover, mite infestation appears to be related to "tight and damp housing characteristics." Presence of mites in the home is reportedly related to allergic sensitization and to the occurrence of rhinitis in the children tested.

STATISTICS AND RISK ASSESSMENT

- [42] "Tobacco Industry Response to a Risk Assessment of Environmental Tobacco Smoke," L.A. Bero and S.A. Glantz, *Tobacco Control* 2: 103-113, 1993 [See Appendix A]

The authors of this paper claim to have evaluated the quality of the scientific data presented in the industry-sponsored comments submitted to the public docket on the 1990 draft of the EPA Risk Assessment on ETS. They claim that the tobacco industry selectively cited only literature supporting its position. Stanton Glantz is a noted antismoking activist. A presentation based on this material was given at the November 1992 American Public Health Association Annual Meeting. See issue 38 of this Report, January 7, 1993.

IN EUROPE & AROUND THE WORLD

REGULATORY AND LEGISLATIVE MATTERS

AUSTRALIA

- [43] Ministers Meet and Approve New Cigarette Package Warnings

On July 7, 1993, Australia's health and police ministers reportedly agreed to require tough new warnings on cigarette packages. The warnings will evidently be rotated and will include the statement "Your smoking can harm others." As of April 1994, cigarette manufacturers will be required to print the warnings on at least 25 percent of the front of each cigarette pack. The top third of the back of the pack will require additional health information. See *The National Drug Strategy*, July 7, 1993.

- [44] Health Minister Wants Phase-in of Smoking Bans

Minister for Health, Wayne Berry, reportedly said, in response to a submission of the Australian Hotels Association, that smoking bans in Australian Capitol Territory (ACT) public places would be phased in gradually. The Minister apparently expects to receive a

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report from the ACT Occupational Health & Safety Council on ETS in the near future and will have something to say on the issue before the end of the year. See *Canberra Times*, August 1, 1993.

CANADA

[45] New Package Warnings to Include ETS Health Effects Claims

The federal government has reportedly given final approval to new cigarette package health warnings which will include the message "Tobacco smoke causes fatal lung disease in non-smokers." The warnings must be printed in two languages and will appear in black and white letters on 25 percent of the front and back of all tobacco packages. The new warnings will apparently not go into effect until July 1994. See *Canada Newswire*, July 22, 1993; *The Gazette*, July 23, 1993; and *Central News Agency*, July 24, 1993.

[46] Critics Say Restaurant Smoking Ban Will Threaten Jobs

Scarborough's plan to ban smoking in all public places, which must be approved by the province before it becomes law, has reportedly been criticized by representatives from Canadian and Ontario restaurant associations. Unless such a ban is imposed province-wide, the critics say, business proprietors will see their business go across city borders. Some 9,200 restaurant jobs are claimed to be at risk. Members of the restaurant associations are reportedly collecting the signatures of patrons who are opposed to the ban and will fight the bylaw when it goes before the council and if it reaches the province. Restaurant owners who now permit smoking in their establishments say that patrons have not raised any complaints about current smoking policies. See *The Toronto Star*, July 22, 1993.

NETHERLANDS

[47] Parliament Refuses to Enforce Smoking Bans

According to a press report, the Second Chamber of the Dutch parliament is ignoring the requests of an anti-smoking group, Clean Air Now, that parliament more strictly enforce the country's public smoking ban. The ban, which includes parliament buildings, is

apparently being violated, but those infringing the ban are not being punished. The director of the health care service is quoted as saying, "It's an internal thing. We don't want to start a witch hunt." See *De Telegraaf*, June 22, 1993.

TAIWAN

[48] Prison Smoking Ban Repealed

On July 8, 1993, the ROC Legislature voted to permit prison inmates over the age of 18 to smoke at designated times and in designated areas. The decision apparently ends a smoking ban that has been enforced in Taiwan penal institutions for more than four decades. Cigarettes and lighters will, under the new policy, be under the control of jail guards to prevent illegal smoking or arson. See *The Free China Journal*, July 23, 1993.

ETS/IAQ LITIGATION NOT INVOLVING CIGARETTE MANUFACTURERS

AUSTRALIA

[49] *Department of Occupational Health and Safety v. Burswood Resort (Management) Ltd.* (Magistrate's Court, Perth) (filed December 1992)

Trial began before a Magistrate in the Perth Court of Petty Sessions on August 2, 1993. The case is a criminal prosecution under the Occupational Health, Safety and Welfare Regulations, in which Burswood Resort Casino has been charged with failing to ensure that effective measures were taken to control the level of ETS so that the health or safety of its employees was not at risk. The casino is Western Australia's largest tourism employer with some 2,600 full and part-time staff. A conviction will carry a maximum fine of \$50,000.

A related prosecution was instituted for the alleged wrongful discharge of a casino employee who aided the Department of Occupational Health and Safety investigation. This prosecution resulted in an acquittal for the casino.

Thus far, witnesses for the prosecution have testified regarding the indoor air monitoring that took place at

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the casino on June 28, and July 11, 1992. It is anticipated that trial will take two weeks. The prosecution has dropped its eye irritation allegation and concluded the presentation of its case with the testimony of two respiratory physicians. One used the EPA Risk Assessment on ETS in support of his testimony and it was admitted into evidence.

[50] Mother Ordered not to Smoke in Front of Children

On July 26, 1993, a Family Court Judge in Adelaide, reportedly ordered the mother of asthmatic children not to smoke in their presence. The order was rendered in response to an application made by her former husband earlier in July 1993. According to a family lawyer in Melbourne, the order will clear the way for similar or even more outrageous demands in child custody cases. See *Sydney Morning Herald*, *Australian Illawarra Mercury*, *Courier Mail*, July 27, 1993; *Daily Telegraph Mirror*, July 28, 1993.

LEGAL ISSUES AND DEVELOPMENTS
AUSTRALIA

[51] Asthma Foundation Director Calls for Smoking Prohibitions

Tim Shackleton, the executive director of the West Australian Asthma Foundation, has reportedly called for health authorities to consider making it illegal for parents to smoke near their asthmatic children. A year-long study was apparently conducted by the foundation which revealed that one in five families with asthma sufferers has a parent who smokes. Shackleton's recommendation was evidently based upon his frustration with the study's findings. See *West Australian*, July 28, 1993.

OTHER DEVELOPMENTS
CANADA

[52] National Arts Centre Bans Smoking

It has been reported that, as of August 1, 1993, the National Arts Centre in Ottawa will ban smoking anywhere in the building. Smoking had previously been permitted in the lobby, box office and foyer

outside the building's cafe. According to a spokesperson for the centre, a survey of performing arts centers across North America revealed that 14 of 25 already ban smoking and the remainder are considering doing so. See *The Ottawa Citizen*, July 7, 1993.

HONG KONG

[53] New Antismoking Campaign Launched

The Hong Kong Council on Smoking and Health (COSH) has reportedly launched a number of new initiatives designed to increase the availability of non-smoking accommodations in hotels and restaurants. The results of a survey on attitudes about smoking in public places conducted in February 1993, were formally released on the eve of a new television campaign which depicts all the customers leaving a restaurant when a smoker lights a cigarette. For further information about the results of the survey, see issue 47 of this Report, May 14, 1993. COSH will also reportedly be meeting with representatives of a hotel association to encourage members to set aside more rooms for nonsmokers. See *South China Morning Post*, July 30, 1993.

UNITED KINGDOM

[54] Smoking Ban Rescinded After Business Slump

Pub manager Mike Wilson has reportedly rescinded the ban on smoking he adopted at the Smugglers bar in Sunderland, Tyne and Wear. The ban was apparently introduced after nonsmoking customers complained about other people's cigarette smoke. After a loss of 30 percent of his business during a three-month period, Wilson decided to end the ban. Promotions such as discounted drinks and meals and karaoke nights could not attract customers, but most former customers returned to the pub within a week of the end of the ban. See *Press Association Newsfile*, July 25, 1993.

WORLD AIRLINE NEWS

[55] Canada

According to a press report, passengers traveling to international destinations will be able to smoke on Canadian airlines following the postponement of a smoking ban that was scheduled to take effect on July 1,

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1993. The Department of Transport, apparently at the request of Canadian Airlines International (CAI), delayed implementing the new policy until July 1, 1994. Evidently, CAI was able to convince the government that it would suffer "an immediate and negative impact" in flights to Japan, as other international carriers have not adopted smoking bans. See *The Buffalo News*, July 18, 1993.

MEDIA COVERAGE

AUSTRALIA

[56] "When the Censors Become Dictators," D. Hampson, *Sunday Herald-Sun*, August 1, 1993

This article criticizes those who think they know what is best for everyone else, and specifically targets the anti-smoking lobby. Stephen Woodward, executive director of ASH, is singled out for endorsing the concept of mothers who smoke during pregnancy being sued by their offspring and a proposal from doctors not to operate on patients who smoke. The author makes the totalitarian nature of such discrimination clear by changing the concept to read that doctors will no longer operate on heroin addicts, AIDS victims, drunks, bad drivers, etc.

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APPENDIX A

The numbers assigned to the following article summaries correspond with the numbers assigned to the synopses of the articles in the text of this Report.

LUNG CANCER

- [32] "Exposure to Environmental Tobacco Smoke and Female Lung Cancer in Guangzhou, China," Y.X. Du, Q. Cha, Y.Z. Chen, and J.M. Wu, *Proceedings of Indoor Air '93* 1: 511-516, 1993

"Cigarette smoking is widely accepted as a major risk for human lung cancer. However, the relationship between ETS exposure and female lung cancer is being debated. Since 1980 to 1988, there have been 5,546 cases of deaths from lung cancer in Guangzhou, and 811 cases of them were never smokers. In this group, 552 cases were from ETS exposure [sic]. In order to ascertain the relationship between ETS exposure and lung cancer, some epidemiological analyses have been performed as follows: (1) Comparisons of medical histories between ETS and Non-ETS exposure of never smokers. (2) Conditional logistic regression analyses of never smokers. (3) A case control study of female never smokers. (4) ETS exposure and cell type of lung cancer. All results of these studies demonstrated that exposure to ETS had no association with female lung cancer."

"[R]esults [of one analysis] suggest that fresh vegetables act as a protective factor against lung cancer, whereas contact with toxic substances increases the risk of lung cancer. It is worth noting that in females, indoor air pollution and situation of kitchen [sic] are risk factors for lung cancer. However, the [sic] respiratory disease, ETS exposure, living conditions, and familial history of cancer, exerted no effect whatsoever on female lung cancer. . . . In the case of males, besides cigarette smoking, the major risk factors were related to occupational exposure."

"The OR of ETS exposure is between 0.61—1.62, showing that spousal smoking, measured either by daily cigarette consumption, or the duration of smoking, is not a risk factor for female lung cancer."

"The results indicated that no differences in cell types were observed between the exposed and non-exposed groups in both males and females. In other words,

exposure to ETS is not to be [sic] etiologically linked to an increase in epidermoid carcinoma of [sic] lung cancer."

"Our studies showed that exposure to ETS had no associated [sic] with lung cancer, but it does not mean that ETS had no harmful [sic] to human health."

- [33] "Involuntary Smoking in the Restaurant Workplace: A Review of Employee Exposure and Health Effects," M. Siegel, *Journal of the American Medical Association* 270(4): 490-493, 1993

"This review assesses the potential health hazard of ETS exposure for bar and restaurant employees. There are two questions considered. First, what is the relative exposure to ETS for bar and restaurant employees compared with employees of other businesses and with individuals who live in a home with a smoker? Second, does ETS exposure in bars and restaurants produce an elevated lung cancer risk among these workers? To answer the first question, published indoor air quality data for bars, restaurants, offices, and residences were reviewed. To answer the second question, the epidemiologic studies of lung cancer risk in food-service workers were reviewed."

"The mean restaurant ETS constituent concentrations are between 1.6 and 2.0 times higher than those in the office workplaces studied, and 1.5 times higher than levels in homes with at least one smoker present. Mean concentrations of ETS constituents in bars are 3.9 to 6.1 times higher than in the office workplaces, and 4.4 to 4.5 times higher than in the residences."

"Six studies have examined lung cancer risk in food-service workers, controlling for active smoking and other potential confounding variables. One of these was a historical cohort study that examined occupational lung cancer mortality. Five were case-control studies that included incident lung cancer cases."

"Taken together, these studies suggest that there is an excess lung cancer risk of approximately 50% (range 10% to 90%) among food-service workers compared with the general population, controlling for active smoking. In the two studies that examined bartenders and other food-service workers separately, this excess lung cancer risk was found for both groups of workers. Thus, it appears that there is an elevated lung cancer risk in both bar and restaurant workers that persists after controlling for active smoking."

"This excess risk could well be due to the increased ETS exposure of food-service workers. However, there are several alternative explanations that must be considered."

"First, residual confounding by smoking might explain the elevation in lung cancer risk for food-service workers. There are several reasons to believe that this is not the case."

"Second, confounding by a variable known to be associated with both lung cancer and food-service employment might explain the observed association. The most important considerations are age, sex, race, socioeconomic status, and diet."

"Third, publication bias might explain why the six published studies reported an increased lung cancer risk in food-service workers....[I]t is not plausible that studies finding no association between lung cancer and food-service employment have been differentially rejected or not submitted for publication."

"Finally, the observed increase in lung cancer risk among food-service workers might be due to a carcinogenic exposure other than ETS. The most important consideration is exposure to cooking fumes....It is quite possible that the increased lung cancer risk among cooks is due to confounding by active smoking."

"An elevation in lung cancer risk attributable to ETS exposure in the restaurant workplace is plausible. Since domestic ETS exposure is associated with a relative risk for lung cancer of 1.3 and this review estimated that typical restaurant ETS exposure is at least 1.5 times higher than domestic exposure, an excess lung cancer risk over 30% in restaurant workers, compared with unexposed nonsmokers in domestic settings, would be expected."

"Public health efforts to regulate smoking in bars and restaurants can no longer focus only on protecting the patron. Food-service workers must be afforded the same public health protection as other workers. To protect these workers from the hazards of ETS, smoking should be prohibited in bars and restaurants."

RESPIRATORY DISEASES AND CONDITIONS — CHILDREN

- [34] "Race and Gender Differences in Respiratory Illness Prevalence and Their Relationship to Environmental Exposures in Children 7 to 14 Years of Age," D.R. Gold, A. Rotnitzky, A.I. Damokosh, J.H. Ware, F.E. Speizer, B.G. Ferris, and D.W. Dockery, *American Review of Respiratory Disease* 148: 10-18, 1993

"In examining the relationships between race and respiratory illness, the effects of gender on respiratory illness rates must be taken into account. In infancy, males have higher rates of lower respiratory illness and wheeze than females. This study examines whether the increased prevalence of respiratory illness in males persists into the school-age period and whether gender differences are similar for both black and white children."

"Hay fever was more strongly associated with maternal smoking for black children than for white children. Maternal smoking was associated with higher asthma rates for boys than for girls. The associations with maternal smoking did not vary with the age of the child."

"The relative odds of any wheeze were 1.16 for children of mothers who were former smokers versus children of mothers who never smoked. Children of mothers who smoked > 30 cigarettes per day had 1.35 times the odds of persistent wheeze, 1.62 times the odds of any wheeze, 1.51 times the odds of chronic cough, 1.29 times the odds of chronic phlegm, and 1.37 times the odds of chest illness as children of mothers who did not smoke. For most illnesses, there was an increase in risk with the amount of maternal smoking when smoking was examined as a continuous variable."

"This study demonstrated a greater prevalence of chronic respiratory illnesses in boys than in girls in this cohort of 7- to 14-yr-old white and black children."

"In each of the four cities, black children reported more asthma than white children. In three of four cities, black children also reported more persistent wheeze."

"This racial disparity in wheeze and asthma prevalence may relate to prenatal or early childhood exposures associated with socioeconomic disadvantage that were unmeasured in this study. Parental education is

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an imperfect surrogate for exposures related to socioeconomic disadvantage."

"The racial differences in respiratory illness prevalences were most prominent in the illnesses most strongly associated with allergy and atopy. Increased exposure to allergens, such as house dust mite or cockroach dust, or increased predisposition to allergy may have played some part in the evolution of these racial differences."

"No racial differences were found in the relationships between respiratory illness prevalence and many of the indices of environmental exposure and body habitus there were measured in this study."

"Black children 10 to 14 yr of age reported taking up smoking less frequently and smoked fewer cigarettes than white children. Mothers of black children, if they smoked, reported smoking fewer cigarettes than mothers of white children."

"The associations between maternal smoking and respiratory illness were comparable in magnitude to the effects of personal smoking and persisted into the early teenage years....Maternal and personal smoking may not be the explanation for racial differences in the prevalence of childhood respiratory disease."

ETS EXPOSURE AND MONITORING

- [35] "Hair Analysis as a Marker for Fetal Exposure to Maternal Smoking," J. Klein, D. Chitayat, and G. Koren, *New England Journal of Medicine* 328(1): 66-67, 1993

"We describe the distribution characteristics of nicotine and its metabolite cotinine in maternal and fetal hair."

"We studied 10 smoking and 11 nonsmoking mothers (mean ages, 19 and 20 years, respectively) in two hospitals in Toronto. From one to three days after delivery, hair samples were obtained from the mothers and their babies by cutting five to seven shafts of hair....The nicotine and cotinine content of the extracts was measured."

"In the nonsmoking mothers, the hair concentrations of nicotine and cotinine (0.9 ± 0.8 and 0.3 ± 0.5 ng per milligram, respectively) were significantly lower than those in the smokers. Similarly, the concentra-

tions of nicotine and cotinine (0.7 ± 0.7 and 0.3 ± 0.2 ng per milligram) in the hair of the infants of the nonsmokers were significantly lower than those in the infants of the smokers. Four nonsmoking mothers were passively exposed to their spouses' cigarette smoking at home. Their mean hair concentration of nicotine (0.9 ± 0.9 ng per milligram) did not differ from that of the other seven nonsmoking mothers (0.9 ± 0.9 ng per milligram), but their hair cotinine concentrations (0.6 ± 0.7 ng per milligram) were significantly higher. The trend was similar in their infants: the infants of the women exposed passively had more cotinine in their hair than the infants of mothers not exposed (0.3 ± 0.2 vs. 0.1 ± 0.1 ng per milligram); but there were no differences in hair nicotine concentrations."

"The positive correlation between maternal exposure to nicotine and cotinine and the accumulation of these compounds in fetal hair suggests that measurements of hair may provide a better estimate of long-term systemic exposure to the toxic constituents of cigarettes and may thereby yield a better prediction of fetal risk."

- [36] "Determination of Airborne Cadmium in Environmental Tobacco Smoke by Instrumental Neutron Activation Analysis with a Compton Suppression System," S. Landsberger, S. Larson, and D. Wu, *Analytical Chemistry* 65: 1506-1509, 1993

"Concentrations of cadmium, a toxic trace element, were measured in the indoor air of several public places where environmental tobacco smoke was present. Particulate-phase cadmium concentrations were determined by analyzing air filter samples....Results show that where environmental tobacco smoke is present, cadmium concentrations are significantly higher than background and that about 80% of the cadmium found in indoor airborne particulate matter is associated with particles with aerodynamic diameters less than 1.8 μm . In one instance, airborne cadmium concentrations in a music club were found to be 38 ng/ m^3 , which is at least 30 times higher than background."

"To evaluate possible health risks due to intake of heavy metals present from ETS, it is important to develop methods to accurately measure the concentration of these metals in indoor air."

"Cadmium is one heavy metal that may be present at high enough concentrations in tobacco to potentially

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cause health risks to nonsmokers over long exposure times....Our measurements show cadmium to be present in an unburned cigarette at an approximate concentration of 1 ppm. When a cigarette is smoked, cadmium is released into the environment in ETS and also retained in the cigarette ash."

"[w]e found that approximately 80% of the cadmium in tobacco goes to the tobacco smoke, indicating that cadmium will be found in ETS."

"Particulate cadmium concentrations in indoor air of some public places where smoking is allowed can be 30 times higher than in a no-smoking area. More than 70% of cadmium in environmental tobacco smoke is found in fine airborne particles (diameters <1.8 μm), which is of toxicological significance since the fine particles have the deepest penetration into the human lung. ETS can be a significant source of cadmium in indoor air, and cadmium may prove to be a good tracer for ETS."

[37] "Estimated Reduction in Exposure to Environmental Tobacco Smoke Through Removing Smoking in the Workplace," A. Raynal, P.S. Burge, A. Robertson, M. Jarvis, M. Archibald, and D. Hawkin, *Proceedings of Indoor Air '93* 1: 639-643, 1993

"A stratified [systematic] sample was taken in a cross-sectional study of 1,200 office workers to assess where their predominant exposure to environmental tobacco smoke (ETS) occurred."

"As many office workers are exposed to environmental tobacco smoke in alternative locations such as their own homes and social venues it is of interest to attempt to quantify the amount of exposure to ETS that is likely to take place for non smokers in each location."

"Some 15 (5%) employees reported no ETS exposure at any source; a total of 244 (85%) reported some exposure at work and 102 (35%) reported that the workplace was their sole source of ETS exposure."

"The 123 persons who reported only one source of ETS exposure had a mean salivary cotinine . . . which was [significantly] greater than those who reported no ETS exposure. The 150 employees who reported more than one source of exposure had a mean salivary cotinine . . . again significantly higher than those who only reported a single source of exposure."

"The data shows [sic] that questioning non-smoking office workers in this population about ETS exposure in terms of numbers of venues and quantity of exposure gave reliable results when validated with salivary cotinines [sic]."

"If smoking were banned from this workplace 85% of non-smokers could expect a substantial reduction in overall exposure to ETS; 35% of non-smokers could be expected to have their salivary cotinine levels reduced to that of the group who reported no exposure, which is nearly half of their current levels; another 49% could expect to have, on average, a reduction of 0.46 ng/ml in their salivary cotinine levels."

"Salivary cotinine is used as a marker of environmental tobacco smoke exposure and it is assumed that there would be a similar reduction in exposure to other components of environmental tobacco smoke which contribute to an excess of cancers, heart disease and respiratory diseases in passively exposed non-smokers."

INDOOR AIR QUALITY

[38] "Effectiveness of Ventilation and Other Controls in Reducing Exposure to ETS in Office Buildings," S.B. Hayward, K.-S. Liu, L. Alevantis, K. Shah, S. Loiselle, F.J. Offermann, Y.-L. Chang, and L. Webber, *Proceedings of Indoor Air '93* 5: 509-514

"A study was conducted in government-owned buildings in California to evaluate the effectiveness of various control measures such as exhaust ventilation and physical barriers for protecting non-smokers from environmental tobacco smoke (ETS) generated by smoking in designated areas in the building."

"This study's objective was to evaluate the effectiveness of several methods of protecting occupants in a non-smoking area from ETS produced in a designated smoking area located in the same building. These methods included 1) siting non-smoking working and/or eating areas adjacent to smoking areas, without a physical barrier and served by the same ventilation system, 2) separating smoking and non-smoking areas by walls, and 3) providing smoking areas, either with or without walls, with exhaust-only ventilation....The amount of ETS present in both smoking and non-smoking areas was determined by measurements of

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total nicotine and fluorescent particulate matter (FPM), sometimes referred to as tar or respirable particles. The movement of air from the smoking to non-smoking areas was traced using an inert gas (SF_6) released in the smoking area(s). We report results of these measurements in three buildings studied."

"Building 1 had a 19 m² glass-enclosed smoking room (within a break room) with a 370 l/s exhaust fan to the outside, and with the HVAC return blocked off. Non-smoking areas sampled included two in the break room, and one in an adjoining office.... Building 2 allowed smoking in a 109 m² portion of the lunch-room with non-smoking areas separated from the smoking areas by partitions 1.2 m high. The lunch-room air was exhausted by a 1490 l/s fan to the patio, and by two kitchen range hoods. Non-smoking areas were sampled behind and on top of curved partitions, and in the office.... Building 3 contained a smoking room with no exhaust fan situated in a basement served by only one return. Two non-smoking sample locations were in nearby offices, and one was in the hall."

"The mechanism for controlling exposure (for a given number of cigarettes smoked) in non-smoking areas can be viewed in two stages. The first is the dilution and/or removal of ETS components in the smoking area itself.... The effectiveness of this stage of control is related to the normalized exposure in the smoking area. These values are substantially higher for all three 'contaminants' in Buildings 1 and 3 than for Building 2."

"The second mechanism is related to the movement of pollutants from the smoking area to the non-smoking area, which is determined by the extent of mixing and convective flows between the smoking and non-smoking areas, including recirculation by the HVAC system. This is related to the existence of physical barriers, to the pressure relationships governing air movement in the building, and to the extent of recirculation."

"The effect of the exhaust fan in Building 1 is most obvious at the second stage."

"The results of this study suggest that an understanding of the airflows in a building is useful for understanding exposures to ETS in non-smoking areas adjacent to smoking rooms or areas. A tracer gas (SF_6) can be used to understand these flows, and has the advantage of much higher detectability than nicotine

or FPM.... Using similar techniques as those in this study, normalized exposures to SF_6 or other inert tracer gases can be used to evaluate the effectiveness of measures to control exposures to any pollutants emitted from localized sources in a building, including those which are impossible to eliminate from the building by a simple ban."

INDOOR AIR QUALITY

[39] "Legionnaires' Disease: The Infective Dose Paradox," S.J. O'Brien and R.S. Bhopal, *The Lancet* 342: 5-6, 1993

"The species of *Legionella* bacteria that cause legionnaires' disease are widely distributed in aquatic habits. Infection via inhalation of aerosols containing bacteria is the main, though contested, mode of [transmission]. Most outbreaks have been associated with aerosols from evaporative cooling systems and complex hot water systems."

"There are several gaps in our understanding of the transmission of legionnaires' disease. One area of uncertainty is the size of the infective dose of the organism required to produce disease in human beings. Animal experiments suggest that a high dose is required, and the fact that there is no person-to-person spread supports this view. However, low concentrations of legionellae seem to be emitted from water systems, and epidemiological evidence indicates that infection can occur at some distance from the source of aerosol."

"Environmental concentration of legionellae might have been underestimated because of technical obstacles to detection."

"Extrapolation from experimental data from one study on the infective dose in animals provided an estimate of 14 million organisms required to produce disease in human beings."

"Certain human beings, including those who are immunocompromised, may be unusually susceptible. Overall, the animal evidence conflicts with the environmental and epidemiological observations."

"One possibility is that the infective hazard of aerosols containing legionellae depends on the survival and stability of the bacterium, which in turn depend on several factors related to the bacterium itself (meta-

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bolic activity, effects of passage, and virulence of the strain) and its relation with other micro-organisms, notably blue-green algae and amoebae....Perhaps non-clinical legionellosis follows exposure to small numbers of bacteria alone, the clinical form occurring as a result of exposure either to a large dose of bacteria or to legionellae packaged in amoebae. Solving the infective dose paradox might lead to new strategies for elimination of this preventable pneumonia."

[40] "Big Air Quality Complainers — Are Their Office Environments Different from Workers with No Complaints?" R.M. Tamblyn, R.I. Menzies, F. Nunes, J. Leduc, J. Pasztor, and R.T. Tamblyn, *Proceedings of Indoor Air '93* 1: 133-138, 1993

"Numerous complaints about air quality among workers in mechanically ventilated office buildings has created an interest in identifying the possible causes of these complaints, and interventions to remedy the problem. There is systematic evidence that complaints about the office environment are associated with work-related illness and sickness absence. What is surprising is that no association has been demonstrated between the worker's perception of the air quality in their work environment and actual measurements of these environmental conditions. It was our hypothesis that the absence of association may be due to a number of methodological problems: inadequate sampling of the prevailing conditions in the workplace, and statistical methods used to summarize these conditions. The purpose of this study was to evaluate this possibility."

"A cross-sectional observational study design was used....A convenience sample of 10 mechanically ventilated buildings were selected for study."

"A self-administered, standardized questionnaire was used to collect data on the worker's perceptions of the usual air quality in their office environment. Workers rated three aspects of indoor air quality: temperature, humidity and air circulation....Workers with major air quality complaints were defined as those who rated all three aspects (temperature, humidity, and air circulation) on the extreme categories of the scale. The comparison group; workers with no air quality complaints, were defined as workers who rated all three aspects as being ideal or close to ideal."

"The same questionnaire was also used to collect information on socio-demographic characteristics (age, gender), health status (atopic history, smoking status, medication use, contact lens use), work characteristics (job type, computer use, tobacco smoke exposure, job control, job stress), and experience with cardinal symptoms of sick building syndrome at work (headache, nasal irritation/stuffiness, dry/sore throat, cough, fatigue, poor concentration, eye irritation)."

"Four environmental conditions were measured: temperature, relative humidity, CO₂, and air velocity. Measurements were taken twice a day, in the morning and afternoon, at 8-10 worksites per study floor."

"Among these workers, 9.3% had major complaints about the usual indoor air quality in their offices and 18.8% had no complaints. Workers with major air quality complaints experienced the same mean temperature and daily range of temperature at their worksite as workers with no complaints. However in repeated samples we found that they were exposed to greater variability in temperature. There were larger deviations in temperature from seasonally adjusted optimal temperature values (above and below) in the offices of workers with major complaints than those with no complaints. Relative humidity was significantly lower in the offices of major complainers, and when humidity deviated from the optimal seasonal range, values for major complainers were significantly lower than those with no complaints. Air velocity was also significantly lower in the offices spaces of workers with major complaints....Using the ASHRAE formula for converting CO₂ to cubic feet per person (cfmpp) of ventilation, both groups of workers received ventilation well above the minimum standard of 20 cfmpp, and the workers with major complaints received, on average, better ventilation (a higher proportion of outdoor air) than non-complainers."

"A greater proportion of workers with major air quality complaints experienced frequent and numerous work-related symptoms (12%) relative to non complainers (0.4%), and a much smaller proportion reported that they had none of the cardinal symptoms of sick building syndrome (4% versus 21%). Major air quality complainers were also more likely to be female, have an atopic history, smoke, and be employed in management or clerical positions. A greater proportion of major air quality complainers were exposed to

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smoke at their worksite, reported less control over their work, and worked longer hours per day at a computer....[W]e found that mean humidity at the worksite, sex, atopic history, and job control were the four factors which were significantly associated with the odds of being a major air quality complainer."

"By using repeated measurements of the workers office environment to provide a more precise estimate of office conditions, we demonstrated that significant differences did exist, particularly in temperature and humidity. Workers with major air quality complaints experienced lower relative humidity, more variable office temperatures, and slightly lower air velocity than workers with no complaints. As estimated by CO₂, workers with major air quality complaints also received a greater proportion of outdoor air. On the basis of the strong association between CO₂ and relative humidity, and the time of year when the samples were taken, we believe these results were attributable to the exposure to lower humidity as the proportion of outdoor air delivered to the worksite increased."

"We found that there were significant linear associations between workers' ratings and temperature, humidity, air velocity, and CO₂ at the worksite....There are four practical implications suggested by these findings. A single measurement of a worker's office environment is too imprecise to draw any conclusions about the usual conditions in their office space. Secondly measurements of indoor air quality need to be summarized to reflect not only the average value, but also the variability in conditions....Thirdly, workers' perceptions that there is an indoor air quality problem in their office space is probably a valid indicator of sub optimal conditions....Finally, inadequate humidification of outdoor air in the winter months in colder climates may lead to more frequent air quality complaints, even when average humidity is within norms for the seasonally adjusted comfort range. A balance needs to be struck between inadequate dilution of indoor contaminants by increasing ventilation, and maintenance of adequate indoor humidity."

"We identified that sex, atopic history, job control, and office humidity were the most important factors for increasing the odds of air quality complaints. These findings suggest that worker susceptibility, coupled with work conditions, and office environment act in a

multiplicative way to increase the odds of air quality complaints and work-related symptoms.

- [41] "Sensitization to Domestic Mites in a Cold Temperate Region," M. Wickman, S.L. Nordvall, G. Pershagen, J. Korsgaard, and N. Johansen, *American Review of Respiratory Disease* 148: 58-62, 1993

"Factors favoring sensitization to house dust mites (HDM) were studied in a cold, temperate climate in northern Sweden. Sixty-five children previously found to react positively to a skin prick test (SPT) to HDM were included."

"In a further analysis the homes of the 65 children were divided into mite-infested (≥ 1 mite per 0.1 g mattress or floor dust) and non-mite-infested homes. More tight and damp housing characteristics were suggested in the mite-infested homes. Dust from beds located on the basement or ground level harbored significantly more mites than did mattress dust from upper floors (OR, 3.9; CI, 1.2 to 12.9)."

"No relationship was found between bronchial asthma or eczema and exposure or sensitization to *Dermatophagoides* [a common genus of dust mite]. However, of the 10 children who were exposed to *Dermatophagoides* in floor dust, all suffered from allergic rhinitis compared with 38 of 54 children who did not. This was also consistent when comparing the occurrence of mites in mattress dust and the occurrence of rhinitis (OR, 4.9; CI, 0.7 to 31.1). Further, a relationship was found between allergic rhinitis and sustained mite sensitization."

"In this first systematic study of HDM allergy in a cold, temperate, and partly subarctic region, we have shown that infestation of domestic mites does occur and is a risk factor for sensitization to HDM....It is conceivable that modern building techniques in combination with energy saving measures have created an indoor 'greenhouse effect' with elevated humidity and high replication of mites even where the climate is cold."

"In a previous case-control study of HDM-sensitized, other atopic, and healthy children, we reported an association between sensitization to HDM and energy-saving measures and damp housing characteristics. In this study, 'low air exchange' characteristics, i.e., additional thermal insulation of mineral wool, win-

dow-stripping, and condensation on window panes were slightly more prevalent in homes in which mites were found than in homes without, thus supporting the data of our previous study. In the present study, no control group was included, which probably explains the less pronounced associations between residential characteristics and HDM-sensitization."

STATISTICS AND RISK ASSESSMENT

- [42] "Tobacco Industry Response to a Risk Assessment of Environmental Tobacco Smoke," L.A. Bero and S.A. Glantz, *Tobacco Control* 2: 103-113, 1993

"The only study to evaluate the quality of scientific data presented by the tobacco industry in response to a government report on ETS was conducted by the New Zealand Department of Health. Its analysis of the New Zealand Tobacco Institute's submission in response to the New Zealand Department of Health's report on ETS found that the Tobacco Institute submitted an incomplete, selective and distorted analysis of the scientific data. Specifically, the New Zealand Department of Health concluded that the submission: reviewed less than 40% of the refereed scientific literature published since the US Surgeon General's report on ETS; cited mainly unrefereed research for post-1986 studies; ignored scientists' defence of their work, presenting criticisms of the work as if they had not been answered; ignored most articles on child health and ETS; accorded small studies as much merit as large studies; and denied the validity of pooling results of existing studies (meta-analysis) to obtain sufficient numbers for analysis."

"This study examines all submissions received by the EPA during its public comment period to determine if submissions from the US tobacco industry presented a pattern of argument and citation similar to that presented by the New Zealand Tobacco Institute. We tested the hypothesis that comments which opposed the conclusions of the draft risk assessment were no more likely to be submitted by individuals affiliated with the tobacco industry than others. We also compared the editorial review policies for the citations in critical comments to the policies for citations in the draft risk assessment to assess the scientific rigor of these two sets of citations."

"We determined whether or not the author of a comment was affiliated with the tobacco industry [TIA]. An affiliation as defined in this study means that the reviewer had a financial or other interest in the tobacco industry. An affiliation does not mean that the reviewer was biased or supported the position of the tobacco industry that ETS is not harmful to health....A reviewer was categorised as being affiliated if he or she, 1) disclosed in the written comment that he or she was a paid consultant to the tobacco industry, 2) received grant funding from the tobacco industry, 3) appeared at least twice at tobacco industry-sponsored symposia, 4) testified as an expert witness in support of the tobacco industry during legal proceedings, or 5) was on the Board of Directors of a tobacco company or the Tobacco Institute. Sources used to determine tobacco industry affiliations were 1) the submissions themselves, 2) curriculum vitae accompanying the submissions, 3) proceedings of tobacco industry-sponsored symposia, and 4) transcripts from legal proceedings."

"The tobacco industry's specific approach in response to the EPA risk assessment was to criticize the draft's methodology by selectively citing the scientific literature that supported its position, rather than citing all the relevant literature. The TIA reviewers often cited unrefereed literature, such as symposia, editorials, and letters-to-the-editor, and they cited this material as though it were peer reviewed. The large number of critical comments on the draft risk assessment suggested on the surface that it was seriously flawed and that the evidence regarding the health effects of ETS remains controversial. However, the majority of the critical comments were submitted by reviewers affiliated with the tobacco industry. The pattern of argument and citation displayed in the TIA submissions was similar to that used by the Tobacco Institute of New Zealand in its rebuttal to the New Zealand Department of Health report on ETS. The comments from TIA reviewers and citations used to support them were in sharp contrast to the comments provided by the SAB, a group of independent experts who also reviewed the draft. The SAB pointed out areas in which the risk assessment could be improved, but its criticisms tended to be more balanced than the TIA reviewers."

"The industry strategy of focusing criticism on individual studies, rather than the evidence as a whole, has been noted previously. By identifying individual

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studies that should have been included or excluded in the risk assessment, the TIA reviewers attempted to show that the analysis was unbalanced. However, they often cited unsupported opinion, such as letters-to-the-editor, editorials, or discussions at meeting proceedings, as evidence that ETS is not harmful. TIA reviewers sometimes misrepresented the findings of individual studies....The TIA reviewers misrepresented literature describing how methods of ETS exposure measurement can be incrementally improved by using it to suggest that currently available measures of ETS are invalid and should not be used at all."

"TIA reviewers attempted to create an unattainable 'standard of scientific proof' by failing to accept epidemiological models of causality and rejection of the null hypothesis. This tactic is identical to one that the industry has used for decades in contending that there is a continuing scientific 'controversy' as to whether or not active smoking harms smokers."

"A frequent criticism of the draft risk assessment was that it ignored the literature on potential confounding factors that can contribute to lung cancer or respiratory problems in children. Although most of the literature cited to support the argument on confounders was peer reviewed, the papers cited did not usually include ETS exposure as a variable and, therefore, were not directly relevant to the EPA analysis....We found that the draft risk assessment cited the available literature that assessed the effects of both ETS and confounders."

"The analysis of the scientific literature used to support specific arguments of the TIA reviewers reveals that the reviewers based their comments on non-peer-reviewed literature to a greater degree than did the EPA risk assessment....The citation of non-peer-reviewed literature by reviewers affiliated with the tobacco industry suggests that the industry was attempting to refute the scientific evidence published in peer-reviewed publications with research or opinion of inferior quality. In addition, the non-peer-reviewed material cited by the critical reviewers was not acknowledged as such and criticisms included in letters-to-the-editor were cited without citing investigators' responses to the letters."

"The tobacco industry appears to be producing publications which can be used to support its contention that ETS is not harmful to health, including

pseudo- or quasi-scientific booklets, pamphlets, editorials, and letters-to-the editor refuting the harmful effects of ETS. In addition, four of the symposia cited in the critical comments explicitly stated that they were sponsored, at least in part, by the tobacco industry. This material was heavily cited by TIA reviewers."

"The tobacco industry has used the comments as part of its public relations campaign to refute the dangers of ETS. The tobacco industry prepared excerpts of criticisms of the risk assessment and released them at a press conference in 1990. These excerpts have been circulated to local legislators where smoking restrictions were being considered in California. In addition, letters-to-the-editor and editorials in local newspapers where smoking restrictions were being considered have cited the TIA reviewers comments as if they represented the EPA's position. One letter stated that, according to EPA Docket No. 600-6-90-006A, 'over 50 scientists speak out against the overblown health issue of ETS'. None of this press material acknowledges that the majority of the comments came from sources affiliated to the tobacco industry, or that these statements did not represent EPA policy."

"By responding to the tobacco industry criticisms, as well as to the criticisms of other reviewers and the SAB, the EPA scientific staff produced a stronger document. However, the involvement of the tobacco industry in the critical comments and the literature cited to support the comments detracted from the scientific value of their criticism. The price to the public has been that the sheer volume of industry documents requiring consideration probably slowed down release of the final report and, perhaps, reduced the resources that EPA devoted to other work. Tobacco industry activities might also have drawn public attention to the report and thereby increased public interest in and awareness of the dangers of ETS."

"As the regulation of ETS exposure continues to be an issue, the tobacco industry can be expected to persist in using the tactics outlined in this paper at the local, national, and international level to refute the independent scientific findings regarding the health effects of ETS. Policymakers concerned with limiting the effects of ETS exposure should be informed about these tactics in order to evaluate fairly the conclusions of scientific consensus documents on ETS."

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